

REMARKS

The claims have been amended to meet the Examiner's objections. The claims have also been clarified.

The claims were rejected as being anticipated by Nicoli et al, "Immunoassay Using Optical Interference Detection". The rejection is traversed because of fundamental dissimilarities between the two approaches, both in structure and function.

Applicants' invention is based on achieving inexpensive, good illumination of samples to obtain a true CCD IMAGE of fluorescing samples. For Applicant's invention the claimed optical features can neither be the samples themselves nor in contact with the samples. Applicants' inexpensive-to-produce optical features must be spaced from the samples, as their function is to launch light through the transparent body at an acute angle toward the remote sample-bearing surface. This angled light, when it reaches the sample support surface, produces a surface wave effect. The surface wave effect travels laterally along the surface on which the samples are deposited. The light, thus concentrated at the sample surface, illuminates the samples with considerable efficiency and excites fluorescence. This is critical to applicants' invention. It enables a true image of the samples to be obtained at an angle that is independent of the angle of illumination. The camera can look directly at the samples, normal to the sample-bearing surface. No INTERFERENCE STRUCTURE is involved. The spacing of the samples is not critical for the principle of applicants' function.

In contrast, as the title of Nicoli et al indicates, Nicoli et al is concerned with providing the sample itself in a microscopic pattern for achieving "optical interference" (with which Applicant is not concerned). Nicoli et al plainly says at column 6 lines 35,36 it "relies on the physical principle of optical interference". As explained by Nicoli et al this "... may be provided by an active antibody coating forming a regular periodic array of parallel stripes of microscopic dimensions..." column 6, lines 52, 53 or by "...depositing an antibody coating on an already existing optical grating", column 6, lines 63-65.

Whereas it is critical in Applicants' surface wave invention for the illuminating optical features to be spaced from the sample, it is thus seen that Nicoli et al requires the sample to be directly at an interference structure.

It seems the Examiner has mis-understood the Nicoli et al structure. Element 10 in Fig. 2C and its related Fig. 1, refers to a solid substrate, not a sample-receiving surface. In any event, in applicant's system the sample rests on typically a plane, uninterrupted top surface, and the optical features are SPACED below it; in contrast, in Nicoli et al the sample and the interference grating must be at the SAME PLACE to function. This clearly proves the difference in structure and function between the invention and the reference.

An inventor of the present invention has offered the following comments that further explain the situation:

"A/ Nicoli shows a method of using "scattered light" beam induced at the same angle as the first order diffracted angle (referred here as the "scattered angle) of a diffraction grating (also known as an interference grating). Nicoli shows that the line spacing is typically 2 to 4 times the wavelength of the illumination light as explained in column 6, lines 55-58 and column 11, lines 10-50, col. 17, lines 51 to 57. This demands that the "optical detectors to detect strong scattering intensity" be "at one or more angles ..." that are defined by the diffraction angle.

"B/ This patent teaches that the grating itself be coated with antibody – col.17, lines 20 to 45 – column 18, line 11 and imaging (detection) be performed with the molecular assay submerged as the index of refraction of the fluid defines the scattering angle –Column 18, lines 23 to 50. The optical features are "on top" of the support and submerged.

"C/ All principal claims of the Nicoli patent specify that an "interference pattern" be created to permit detection by the patented technology. See claims 1,13,25, 37,49, 61, and 75. where "an interference pattern in accordance with the modulation properties of the predetermined antiligand....".

"The present application teaches very different technology and design:

“a/ The detection angle is typically normal to the support. The light source illumination angle and the detection angle are totally independent (unlike Nicoli et al).

“b/ The application specifies a construction where the optical elements are “located below and spaced from the support” not AT the support surface where Nicoli has its sample and fluid.

“c/ The application teaches forming an image of the support surface on a CCD camera, e.g. on a viewing axis normal to the support surface, and that such image be transmitted to a computer for analysis. The image has no interference pattern.”

REVIEW OF REJECTION ARGUMENT

Claim 1

Claim 1 of the present application specifies that the optical features be located **below and spaced from** the array-support surface so that light after reaching the optical features must **THEN** pass through the transparent body below the support surface, at an acute angle to the support surface.

Nicoli et al., in contrast, discloses an array-support surface **on top** of the support surface. Please see Fig 1a, Fig 2a, Fig. 2b, Fig. 2c, Fig. 3, Fig 4a, Fig. 4b, and Fig. 4c. This patent clearly teaches that the grating itself be coated with antibody – col.17, lines 20 to 45 – column 18, line 11 and imaging (detection) be performed with the molecular assay submerged as the index of refraction of the fluid defines the scattering angle –Column 18, lines 23 to 50. The optical features are “on top” of the support and submerged..

The present application teaches only methods to induce **surface waves**.

The Nicoli et al patent does not teach how to create a surface wave. It **only teaches how to create a beam refracted by a liquid covered grating that is deflected from the normal but clearly not a surface wave**. It teaches how to calculate such an angle.

The design of the cited patent does not permit a true image of the array be obtained. As all principal claims of Nicoli et al. clearly express “**an interference pattern in accordance with the modulation properties of the predetermined antiligand**...”. is obtained.

The present application teaches how to inexpensively obtain an **image** of the array independent of the angle of illumination.

Claim 1 is clearly not anticipated by Nicoli et al.

Respecting amended claim 2, there is no further teaching in Nicoli et al. of an uninterrupted planar support surface that bears spots of samples of spot size between about 50 and 500 micron diameter.

Respecting amended claim 3, there is nothing in Nicoli et al. further to suggest a microscope slide having a support surface constructed to be imaged at an angle normal to the sample support surface.

Respecting amended claim 4, there is no further teaching in Nicoli et al. of the field of embedded optical features, under and spaced apart from the support surface, being unwetted.

Certainly there is no teaching in Nicoli et al of claim 20, of a wave-guide being formed along the support surface nor of claim 29 of the support constructed to launch an evanescent wave along the array-support surface.

Certainly there is no teaching in Nicoli et al. of combining the claimed structure with a tilt control mechanism, claim 46, and especially not comprising a stepper motor and elastic motion divider, claim 50.

The other claims under examination also bring out important features not fairly taught in combination with claim 1 by Nicoli et al.

Neither does any of the other references of record change the picture.

US 2003/0223059 deals with a transmission grating used as one of the elements in a reading microscope in order to read simultaneously the presence of different wavelength fluorophores. This is distant from the present invention.

US2003/0129654 is even more remote. It does not involve surface waves.

US 6,356,676 similarly is distant, being for a method of injecting light in a flow cell or waveguide.

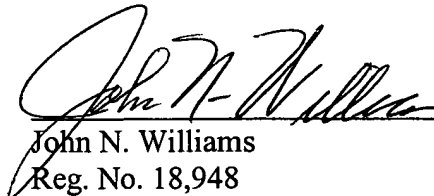
Accordingly it is submitted that no cited reference nor any fair combination of them teaches the subject of the present claims and early favorable allowance is solicited.

Enclosed is a \$225.00 check for the Petition for Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date:

June 12, 2006



John N. Williams
Reg. No. 18,948

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906